

VAB Doors Blast Media Recycling



Kennedy Space Center

Vehicle Assembly Building (VAB) -- Spring 2005

VAB Doors Refurbishment

Project Overview

- The VAB doors refurbishment project is a multi-million dollar effort, extending over several calendar years, and containing 5 primary tasks:
 - Construct and install a vertical lift door (VLD) platform
 - North transfer aisle door (NTAD) removal, refurbishment, re-installation
 - In-place horizontal doors refurbishment (high-bays 1 & 3)
 - In-place vertical lift doors refurbishment (high-bays 1 & 3)
 - Refurbishment of door counterweight wells
- With the exception of HB-1, all tasks started field operations in 2004, with initial abrasive blasting test operations performed in July 2004. HB-1 work efforts are just beginning, and are subject to the access and scheduling challenges that result from return to flight operations.
- NTAD and HB-3 (horizontal doors interior only) were completed in 2005
- VAB high bays 2 & 4, and South transfer aisle doors (STAD) are planned for a follow-on contract, but are not yet funded

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Interesting Aspects Of The Project:

- Work requires scaffolding +/- 100 feet high
- The VLD platform that will be used in high-bays 1 & 3, is nearing completion in the South VAB parking area
- When finished, the platform will be over 104 feet in length, over 70 feet wide and high, and weigh more than 208 tons with the counter weight. It will be hoisted into place and positioned by VAB cranes, and will serve as both a work platform, and as an enclosure for VLD work operations.
- Abrasive blasting operations, using plastic media with aluminum oxide, will be conducted on/in the VLD platform, positioned between the 32nd and 34th floors, inside the selected high bay. The platform could be used in all 4 high bays.
- Each vertical door section (there are 7 in each high bay) will be brought separately into the VLD platform enclosure for rework. A temporary weather enclosure will replace each door section during refurbishment.
- Due to VAB floor weight limitations, some of the equipment required for abrasive blasting operations may be staged on the ground, with piping and connections (temporarily) routed on the side of the VAB exterior, then into the VLD platform location

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Interesting Aspects Of The Project (continued):

- The project includes significant engineering challenges, and requires enormous amounts of planning and coordination. Tasks include the disassembly and reassembly of steel structures, large scale steel fabrication work, abrasive blasting, corrosion control and repainting requiring huge containment structures, etc.
 - The scope requires access to large fabrication and lay-down areas, which are located to the North and South areas of the VAB grounds
 - Work requires numerous pieces of equipment in support of operations, to include: vehicles and lifts, mobile cranes, generators, blast pots, dust collectors, welders, compressors, recycling equipment, etc.
 - Currently, about 150 construction workers are involved at the site
 - Engineering is on-going
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- The project photographs included here, offer only a snapshot of the scope and complexity of these door refurbishment tasks

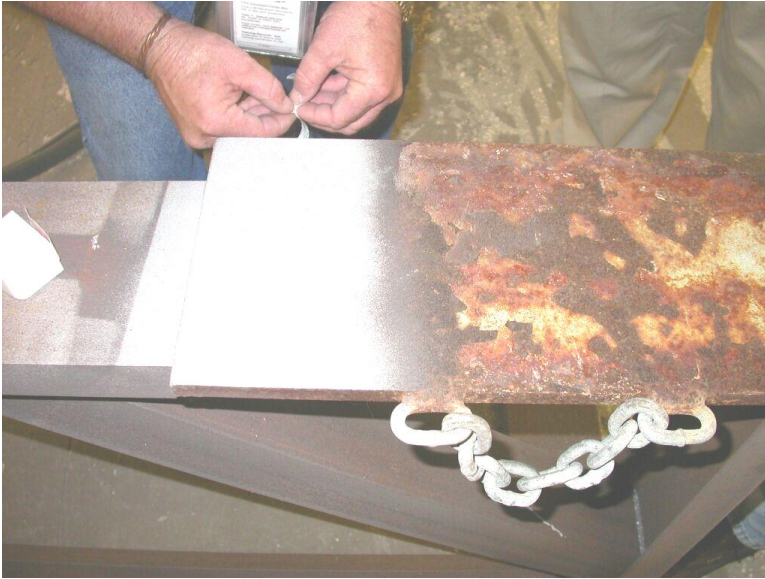
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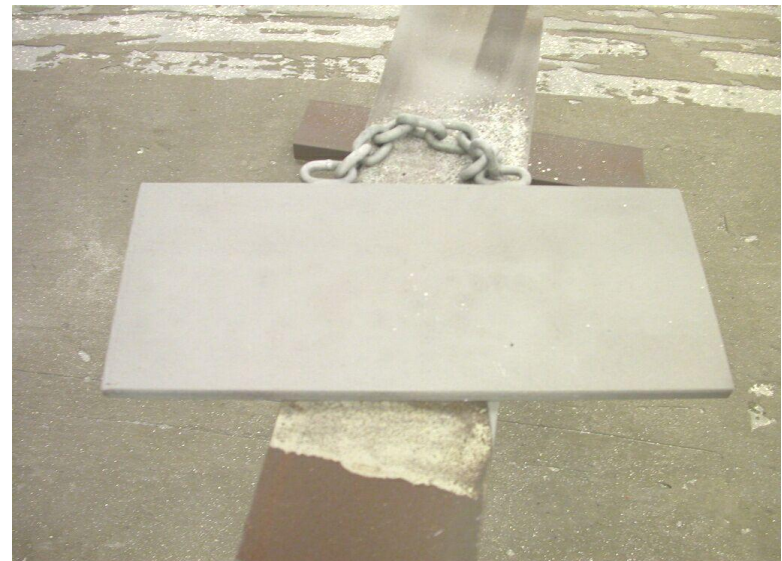
Plastic Blast Media With Our Badly Corroded Test Panel



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**In-work and Completed Test Panel
Blasting Results**



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Plastic Blast Media Information

- Space Gateway Systems (SGS) has been using this plastic media for some time at their KSC corrosion control facility (a controlled environment) with positive results—on a much smaller scale
- This was discussed with USA Corrosion Control personnel during a partnering meeting. USA was particularly interested in the media containing aluminum oxide, which is capable of removing corrosion on steel structures.
- KSC steel structures and NACE corrosion standards necessitate an abrasive blasting process which produces a profile suitable for using inorganic zinc paint coatings
- Plastic media (only) removes old paint coatings, however, used with aluminum oxide, the media provides the required profile on the blasted steel
- Previously, USA had explored other (recyclable) alternatives to traditional blasting medias, largely without much success. The open nature of the structures to be refurbished, the sizes of the structures (Pads, spheres, MDD, 500 foot weather tower, etc.), the cost and complexity of full encapsulation, have inhibited USA's large-scale use of recyclable blasting medias.
- Hopefully, this project opens the door to new applications and technology, better awareness, alternate choices, and more 'outside-the-box' approaches for USA construction projects in the future

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Plastic Blast Media Recycling And Cost Benefits

- **VAB Door Project Estimates:**
 - **~ 755 cubic yards of (probably hazardous) spent abrasive blast media waste**
- **Preliminary paint coating sampling showed high levels of heavy metals and trace amounts of PCB's**
- **Estimates for disposal: \$455,530 for 1,731,507 pounds of hazardous blast debris/paint**
- **The logistics and costs of handling and disposing this volume of waste material, from the 32nd floor of the VAB, create significant challenges and concerns**
- **Original plans to use black beauty abrasive, evolved to using Garnet, which typically provides 2 or more uses, although more expensive**
- **The scope and complexity of the work, along with project estimates for spent blast media waste volumes, demanded that we consider other alternatives**

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- **Plastic Blast Media Recycling And Cost Benefits** (continued)
 - Construction Management CTM suggested trying another recyclable blast media (plastic media with aluminum oxide) instead of Garnet. This media is lighter, and offers more re-uses also.
 - Following a controlled test of the media at the SGS corrosion control facility, the USA subcontractor (Met-Con) subcontracted blast media lease and recycling services with US Technology Corporation (UST)
 - Assuming a successful, large-scale field test on the VAB project, this process/product will be integrated into future USA construction/corrosion control efforts, where possible
 - Currently, 100% of the removed coatings and plastic blasting media from that process are recycled to UST for re-use
 - A minimum of 5, and as many as 10 re-cycles of the plastic media are typical. The cost of plastic media requires: tight containment, operator controls that maximize media re-use, and attention to spent media collection and recycling practices to ensure cost effective success.

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- Additional Benefits Of Using Plastic Blasting Media...
 - Less weight. $\frac{1}{2}$ the weight of Garnet. This will allow the blasting equipment to be located on the 32nd floor of the VAB during operations.
 - Reduced dust. Plastic media does NOT pulverize into dust. The only dust produced is from the coatings being removed. This results in better vision during blasting, is safer for the blaster—and it also reduces the chance of accidentally contaminating the VAB.
 - Reduced air pressure. Conventional blast media requires a minimum of 90 psi at each blast nozzle. Plastic media works well at 50 psi. It also results in lower worker fatigue. (less equipment is also required)
 - Less noise. Blasting with 50 psi versus 90 psi results in substantially lower noise levels. Noise has been an unforeseen concern inside the VAB during HB-3 operations.

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Recycling/Recycler Information....

- The recycler, US Technology Corporation, was founded in 1978. They are the originator of the plastic blast media blasting process, and the leading worldwide supplier of plastic blasting media.
- UST supplies 85% of the US Department of Defense plastic blasting media, and created the largest reduction of hazardous waste from DoD operations
- UST has had a total environmental impact of 1,070,000,000 pounds
- Some of their other customers include SGS, Lockheed Martin and Boeing
- Their lease/recycle program was introduced in 1992
- UST manufactures a finished recycled product under their patent
- The UST recycling process is a closed loop program
- Some of the products that include UST recycled materials:
 - household products, tables, chairs, picnic tables and outdoor furniture, water resistant blocks, security barriers, etc.

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**VAB HB 3 Vertical
and Horizontal
Doors**

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Why We're Doing This Work....



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Why We're Doing This Work...



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HB 3 Horizontal Door Work, Scaffolding and Containment

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HB 3 Scaffolding and Containment



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HB 3 Rail and Containment



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Rail Additions For VLD Platform



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Early VLD Platform Fabrication In South VAB Area



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VLD Platform Nearing Completion



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North Transfer Aisle Door Removal Images



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Removed NTAD Section Inside Containment



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North Transfer Aisle Door Containment



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North Transfer Aisle Door Containment

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Completed North Transfer Aisle Door Interior



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Completed North Transfer Aisle Door Exterior



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Blast Containment “Big Top” Under Construction



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North Parking Lot Blast Containment and Lay-Down Area



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Pressurized Blast Pots



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**Equipment and Activity At
North VAB Work Area**

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North VAB Worksite Aerial View

